

The Role of Social Communication Tools in Education from the Saudi Female Students' Perceptions

Nawal Hamad Mohamad Aljaad¹

¹ Educational Policies Department, College of Education, King Saud University, Saudi Arabia

Correspondence: Nawal Hamad Mohamad Aljaad, Educational Policies Department, College of Education, King Saud University, Prince Turkey street, Exit 2, Riyadh, Saudi Arabia. Tel: 966-554-451-514. E-mail: prof.nawaljaad@gmail.com

Received: January 24, 2016

Accepted: March 2, 2016

Online Published: July 26, 2016

doi:10.5539/ies.v9n8p194

URL: <http://dx.doi.org/10.5539/ies.v9n8p194>

Abstract

This study aims at identifying the role of social communication tools in education from the Saudi female students' perspectives that are studying at the college of education in King Saud University-Riyadh. This study used a survey, which was distributed to 500 female students. The results showed that 90% of respondents used social media where 95% said social media improved interaction with other and raised the sense of social responsibility, 56% used all tools of social media. 45% used social media more than 6 hours daily. 61% believed that social networks promoted democratic values and spread political culture. 62% of respondents used social media to do homework or academic projects and researches. 99% of respondents believed that social media allowed following new information about their academic specialty and obtained specialized scientific consulting. 79% of respondents believed that one goal of creating accounts in social networks were learning specific science knowledge or a foreign language. 9% of respondents benefited from social media in social educational consulting. 44% of respondents preferred to debate in scientific and educational topics. 84% of respondents agreed that social networks provided the opportunity to form relationships with those interested in a particular scientific subject and exchanged experiences and information with them.

Keywords: educational, technology, social media, communication, tools, instructional, Saudi, female

1. Introduction and Background

Communication is considered one of the learning processes in human societies. It changes according to time and place in which it is done (McKinney & Rill, 2009). With technology advancement, social communication has become more influential, especially with the advent of web 2 and web 3. While using the Internet for communication and establishing relations with others, people fulfill their personal and social needs previously served through traditional means. One of these needs is the need for affiliation (McKinney & Rill, 2009). People have started meeting virtually to maintain these relations ignoring the physical limits of time and space. The construction of the sites of social networking is based on this need, as the goal behind social networking sites is to present means that may enable users to communicate, participate and continue their communication without considering the time and place.

In the present century, online social websites are considered one of the most important phenomena of technology. The number of their users has increased over the last years. The vast usage of laptop and third generation of mobile phones has contributed in connecting and following up with users of these social websites. Moreover, the quick and modern life style has also contributed in their vast spread. Most of the people exchange messages and conversations through networks as people are busy and do not pay attention to the actual social life (McKinney & Rill, 2009)

Psychologists emphasize that human brain's storing capacity of information or vocabulary depends mainly on the psychological condition of the receiver (Halil, 2012). Hence, these websites are expected to be among the tools that can generate a revolution in the field of teaching if employed to serve the requirements of knowledge and science. The students will be more enthusiastic especially when the subject matter is related to the usage of social communication networks in subjects that may be considered by some to be "complicated". Among those subjects is foreign language learning that rely mainly upon openness, dialogue and conformity within the study environment.

To sum up; social networks could help in solving some educational problems related to dehumanized and non-interactive e learning. Those networks added human dimension through participation and also included human interaction to the educational process, which will help in attracting learners and increasing their desire to seeking knowledge. It is expected that the coming stage will see new patterns of learning where the Internet and its various tools including social communication sites will play a focal role in education.

1.1 Problem of the Study

Considering the importance of the World Wide Web “Internet” and its role in information revolution and the spread of social communication tools in all social aspects i.e. cultural, political, scientific, educational and religious etc, it is essential to study the effect and power of social communication tools in education. Discussing this subject may contribute in overcoming the hurdles and difficulties that face students while learning and studying. Hence, this paper will present some recommendations for decision makers to improve the standards of education, teaching and the teaching methods in light of the technological developments all over the world. Also, the current study tried to highlight the role of social media in education from the Saudi female students’ perspectives.

1.2 Questions of the Study

The current study tried to find out an answer about what is the social media role in education from the Saudi female students’ perspectives. Following are three minor questions that are derived from the main question:

- 1) What is the level of using social communication tools among the Saudi female students?
- 2) What is the role of social communication tools in developing the interaction of Saudi female students among themselves and with others?
- 3) What is the role of social communication tools in developing the scientific and academic aspects among Saudi female students?

1.3 Importance of the Study

The importance of the study lies in being one of the studies that discuss the role of social communication tools in developing the interaction of Saudi female students among themselves and others. It also studied of social communication tools on developing the scientific and academic aspects among the female students. Similarly, the findings of this study will help those who work in the educational and teaching sectors to identify the range of possible advantages of using social communication tools in improving teaching and learning processes in female sections.

1.4 Aim of the Study

This study aims at identifying the social communication tools’ role in education from the perspectives of Saudi female students in the College of Education in King Saud University.

2. Literature Review

2.1 Theoretical Framework

Internet is considered as a World Wide Web for communication. It connects tens of thousands of computer networks. It is considered as a communication system that allows computer machines to exchange communication. Researchers in the field of communication define it as a cooperative means of communication that includes a huge number of computer networks worldwide which allows individuals and groups to use as a means of communication on a vast mass scale (December, 1996). This consequently led to the creation of virtual societies-social groups of individuals living in different places of the world and coming close to each other to communicate on a continuous basis by using the Internet. There are many joint factors that bring these individuals together; they interact as if in real world but at a distance through a communication mechanism which is the internet (Howard, 1996).

2.1.1 Educational Usages of Social Media’s Tools

This portion of the study is dedicated to highlight some educational usages of communication social tools. Blogging, Facebook, and Twitter are examples of these tools.

a. Blogging

Blogging is used in different educational purposes; for example, it is used for

- Publishing research papers and school homework. Dinkson University in the United States has established a blog-and-wiki -hosting system where students use the blogging system in publishing their research papers

and homework electronically instead of the traditional way.

- Creating an environment of cooperation and constructive dialogue between the students through following up the blogs of their colleagues and commenting on them. So; the blogging is used as a comprehensive reference for subject exercises; a math teacher in one of the public schools in Canada took advantage of the blogging technique and came up with a code or entry book for math subject. He made a blog in which the students could solve the math book exercises, chapter by chapter. He published all exercises' solutions so that the blog may serve as a comprehensive exercise reference for students to refer back to it in the following years. This was considered as an electronic portfolio for the students to store their work so that they may consult them when the need arises (Al-Khalifa, 2008).

b. Facebook

The following points show how one can use Facebook in education. Teachers or students can create a Facebook page or a Facebook group then they can

- Invite students to participate by exchanging information, share and exchange Internet links relevant to the subject.
- Upload educational photos and videos relevant to the subject. Students and people who are interested can share, discuss and comment on them.
- Make friendship with people interested in the subject or certain educational topics all over the world. Then, they can exchange information and expertise.
- Use Facebook as a tool to make graduates keep in touch with one another and make them keep learning and self-developing in the subject.
- Use Facebook to invite students (among others) to different educational events (Madge, Meek, Wellens, & Hooley, 2009; DeSchryver et al., 2009).

c. Twitter

Livingston (2008) reported that Twitter is used in education to

- Follow-up conferences and seminars; most conferences and seminars have exploited Twitter to announce current events and remind participants of certain issues.
- Update courses; a teacher of any course can make a Twitter account for that course and ask students to follow it and receive text messages on their mobile phones.
- Follow-up of college and university announcements; the administrator of the university or college website (webmaster) links newsfeed to Twitter allowing students to receive text messages about the latest news.
- Facilitate project management; students or instructors working together on a project can communicate with each other using Twitter. They can remind each other of project matters and the status of the project. For them, this alternative is faster than forums.
- Activate debate and discussion; the interactivity of Twitter can help a group of people through creating channels for debate and discussion about certain topics.
- Restrict writing; the service provider of Twitter restricts the number of characters (letters and symbols) to 140. This means that the writer must be more perspicuous and more specific about the message that he/she wants to deliver.

2.1.2 The Role of Social Tools in Teacher-Student Communication Method

Many Saudi faculty (staff) members like other faculty members all over Saudi Arabia started using social networks to communicate with their students in order to create a transparent and interactive learning environment (Al-Khalifah, 2008). They did so in order to help students being active elements who are responsible about their learning. Instructors help their students to avoid being negative recipients of information in class. Faculty member can use social networks to build and develop a course, communicate with students and get feedback from them. For instance, before teaching a course, an instructor can create a social network account. Experts and students who feel interested can follow these accounts and the instructor can consult them. This can help the instructor to define the content and goals of the course. More over; during teaching the course, the instructor can upload the syllabus or components of the course that include the curriculum, the evaluation system, the textbooks, references, slides (PowerPoint Presentations), homework assignments and different announcements. In addition, the instructor can use social networks to divide students into teams if there is a

collaborative task like a project. To add; students can use social networks for submitting and receiving homework assignments as well other assigned tasks. Finally, using their profile pages, instructors can send messages to one student or a group of students if necessary.

2.1.3 The Role of Social Communication Tools in Implementing Research and Homework Assignments

Instructors can use social networks for research and homework assignments through using new techniques that encourage students to raise issues and be creative or even enable students to exchange books and borrow them from each other. Social networks can increase the number of learners by facilitating their communication with their instructor. More over; social networks spread the culture of technology and enlighten students by updating them about the latest developments in their majors. Social communication tools give shy students an opportunity to express their opinions in writing, which will help them to arouse their creativity.

2.1.4 Social Communication Tools' Economic and Social Benefits in Education

Social communication tools have become part of our daily life. They have invaded all aspects of life by providing services like training, education and entertainment. They have social and economic benefits since they reduce expenditure on classrooms, university building, tools and teaching aids. Social communication tools also reduce traffic jams in the streets of the city; and help in environment preservation as they decrease the use of printed papers.

2.1.5 Services Provided by Social Communication Tools

Social communication tools provide users with different services, such as:

- **Profile page:** One of the main distinguishing factors of social communication tools is the profile page. Through it, one can know the name of the person and basic data about him/her such as: gender, date of birth, country, interests, photos, etc. The profile page is considered a gate through the personal world. On the main page of the account (i.e. timeline), one can know an updated account of the person's activities, friends and uploaded photos, etc.
- **Friends and connections:** They are people with whom a person gets acquainted for particular reasons. Social networks call the person one adds to the friends' list "a friend". However, some social networks of professionals call this person "a connection" or "a relationship".
- **Sending messages:** Using social networks, one can directly send somebody a message whether this person is in the friends' list or not.
- **Photo albums:** Social networks allow users to create an unlimited number of photo albums and they can upload hundreds of photos. Users can share them with friends and they are available to view and comment on.
- **Groups:** Many social networks allow their users to create groups that share a certain kind of interest. One can create a group with a certain name and certain aims. Social networking websites provide the developer of the group and those who join the group with a space. This space looks like a miniature forum that has a miniature album of photos. Social networks also provide the feature of arranging meetings through what is called "**Events**". One can invite the members of such groups to events (i.e. meetings) and can know who attended and who did not.
- **Pages:** Facebook invented this idea and used it commercially in an effective way. Now, it is working on advertising campaigns that allow owners of commercial products to get paid for each click made by users who click on the advertisement. The idea behind such pages is based on creating a page that includes information about the product, person or event. Then, the users browse these pages through certain partitions and if interested, they add them to their profile page (Halil, 2012).

2.2 Previous Practical Studies

The researcher reviewed literature related to Social communication tools effects and uses in different areas. McKinney & Rill (2009) studied the effects of YouTube discussions on a group of university students, their number was (311) students. They aimed at finding the implications of the available discussions on the CNN and YouTube. McKinney & Rill put a special focus on the effects of these discussions on youth and their attitudes toward democracy as well as their political values. The results of this study reflected the success of this method of debate as it makes the youth more active and raises their political effectiveness and efficiency as well as their trust of the candidates. This method also decreased the amount of political satire and joking about the candidates. It also helped with reinforcing effective information desired by the candidates in the minds of the youth.

Livingston (2008) studied teenagers' use of social networking sites for intimacy, privacy and self-expression. This study explored teenagers' practices of social networking in order to uncover the proper connections between online opportunity and risk. She proved that expressing ideas and identity on social networks exists within real relationships. Her study draws a picture of the contradictions between the real world and the virtual world of teenagers. She gave a binary classification of social networking sites. Thus, she proposed one of the several meanings of shaping online privacy.

In his study: "Internet usage and its impacts on Saudi youth: An analytical study", Aljohani (2009) investigated the impacts of using the Internet on Saudi youth as well as how they used it. The results showed that 26% of the sample agreed that forums had an effect on spreading the culture of sectarianism or tribalism. Males spent more hours on the Internet than females; they nearly spent twice the number of hours. The study also showed that the majority of Internet users were youngsters and youth.

In his field study in Qatari community: "The effect of Communicating through the Internet on social relationships", Sari (2008) investigated the effect of communicating through the Internet on social relationships in the Qatari community that recently witnessed a massive use of the Internet. This study uncovered various social dimensions of communicating through the Internet that had noticeable effects on the nature of social relationships in the Qatari community. The results showed that all youth use the Internet for their communication with considerable experience regardless of their age, education, marital status and profession.

Halil (2012) investigated student teachers' social network usage tendencies and tried to identify what sort of social and educational activities they practiced on these networks. The study was carried out on five student teachers studying at various departments of Ankara University, Faculty of Educational Sciences. It was a qualitative research and the data were collected via two-hour focus group interviews. The data were analyzed through content analysis. The results indicated that the most useful social network according to the teacher candidates is Facebook. Student teachers use social networks for fun, sharing, social responsibility and educational purposes as well as communications. Exchanging personal information was the commonest use of Facebook for communication. At the same level of commonness of use, there was sharing of different data like videos, photos, songs and poems. Participants believe that social networks are safe and confidential provided that they are confident of their security settings. The study also showed that social networks improve social interaction among their users depending on the type and goals of usage.

Many researchers of education technology supported using Internet social networks for educational purposes. They shed light on the benefits of using technology in the field of K-12 Education (education from Kindergarten to 12th Grade) (Barbour & Plough, 2009) as well as in higher education (Deschryver et al., 2009; Veletsianos, 2011; Webb, 2009).

Social networking technologies are considered a collaborative educational tool that is capable of dealing with educational problems. It is capable of creating a feeling of presence, building the society and engaging learners in interactive discussions (Brady et al., 2010; Lee & McLoughlin, 2010; Naveh et al., 2010).

Some studies indicated that using online social networks helped learners in establishing social relationships with others. It also helped with exchanging ideas, inventing products, building identities and getting feedback in due course (Dron & Anderson, 2009; Greenhow, 2011; Wheeler et al., 2008).

Research in the field of informal education in social networking sites indicated that participant's satisfied important social needs (Greenhow & Robelia, 2009). However, Selwyn (2009) objects to this, as he believes that this interaction took place naturally on Facebook among students. Therefore, it cannot be considered "education". On the other hand, Schroeder (2011) put forward a lengthy list of the problems that might probably arise while using social networks in higher education. This list includes the burden of work on the part of the faculty (staff) members and the students, and the lack of trust in the reactions of peer faculty members and students. It also includes intellectual property issues, a difficulty in adapting to the publicly available tools and a difficulty in protecting students' non-disclosure.

Moreover, Madge, Meek, Wellens, and Hooley (2009) believed that social networking sites could be more beneficial for informal education than formal education. Their research showed that 91% of university students did not use these tools for college communication, of which 43% did not believe that social networking sites had any academic usage whatsoever.

3. Method

3.1 Methodology

This study used the survey method for a sample of (500) female students from King Saud University. This way in collecting data is considered as “an organized method and effort that helps in describing the phenomenon, getting data and information about the phenomenon concerned and presenting a real picture of or possibly closest to the reality regarding the phenomenon” (Umar, 1994).

3.1.1 Population

All the female students of the College of Education at King Saud University in Riyadh-Saudi Arabia during the academic year 2015-2016.

3.1.2 Sample

A random stratified sample proportionate with the size of the study population has been taken so that it may represent it in the best way and help achieve the goal of the study. The sample includes (500) female students who use the websites and tools of the social communication. The study population was identical in gender, educational level and age.

3.1.3 Validity

This study relied on a questionnaire to collect information. Items were selected based on studies and researches in the field of social media and their educational impact. The questionnaire has been initially prepared by the researcher to include 33 items and then presented to specialists in the field of social media that had some notes on some items, which were cut down to twenty after arbitration.

3.1.4 Reliability

The instrument was implemented on a random sample which was selected other than the sample that the study was conducted on (pilot study). Then, a statistical analysis was performed (Cronbach Alpha) to verify the reliability of study instruments. Cronbach Alpha was 0.87, which was an accepted value to prove that the study instrument was reliable.

4. Findings

4.1 Findings of Question #1: What Is the Level of Female Students' Use of Social Communication Tools?

Following are the findings of question number 1:

- 90% of respondents used social media.
- 56% of respondents used all tools of social media.
- 45% of respondents used social media more than 6 hours daily.
- 35% of respondents browsed only one site of social networks.
- 50% of respondents said that social media are considered a necessity in their daily lives.

It is obvious that the above findings of this study are consistent with the results of Severino and Messina (2010) study, which indicated that social network sites are one of the most important technological phenomena in the current century attracting a growing number of users in recent years. The findings of this study also support the findings of a study conducted by Surrey (2008) showing that all young people use the Internet as a means of communication in their daily lives regardless their age, educational level, social status, or their career and with decent experience in usage.

4.2 Findings of Question#2: What Is the Role of Social Communication Tools in the Development of Female Students' Interaction with Each Other and With Others?

The findings showed that

- 95% of respondents said that social networks improved interaction with others and raised the sense of social responsibility.
- 61% of respondents believed that social networks promoted democratic values and spread political culture.
- 57% of respondents were involved in various support and boycott networks in social networks.
- 84% of respondents agreed that social networks provided the opportunity to form relationships with those interested in a particular scientific subject and exchanged experiences and information with them.
- 47% of respondents believed that social networks allowed following news of colleges, departments,

seminars and conferences.

- 78% of respondents said that academics within social media adhere to ethics and morals of dialogue.
- 79% of respondents followed the updates but watch without comment.
- 23% of respondents said that social networks had good security and confidentiality.
- 83% of respondents believed that social media could cause harm and had some disadvantages.

These findings are consistent with the findings of Schroeder et al; study in (2010) which showed that there is a list of negative issues about using social media in education. On the other hand, one of the results of this study conflicts with the results of another study by Madge, Meek, Wellens, and Hooley (2009) which indicated that 99% of users think that the purpose of creating accounts in social networks is to improve the knowledge of their academic specialty.

4.3 Findings of Question#3: What Is the Role of Social Communication Tools in Developing Scientific and Academic Aspects of Female Students?

Different roles of Social communication tools in developing scientific and academic aspects of female students appeared in various portions; for instance

- 62% of respondents used social media to do homework or academic projects and researches.
- 99% of respondents believed that social media allowed following new information about their academic specialty and obtained specialized scientific consulting.
- 79% of respondents believed that one goal of creating accounts in social networks was learning a specific science knowledge or a foreign language.
- 9% of respondents benefited from social media in social educational consulting.
- 44% of respondents preferred to debate in scientific and educational topics.
- 94% of respondents benefited from social media in getting religious information and access to doctrinal consulting.

These findings are consistent with the results of a number of previous studies. For instance, S. Wheeler, Yeomans, and D. Wheeler (2008), Dron and Anderson (2009), Greenhow (2011), Brady et al. (2010), Lee and McLoughlin (2010), and Naveh (2010) who consider communication social networks as a type of participatory educational tools which are capable of addressing educational problems and creating a sense of presence, community building, and learners' participation in interactive discussions. In the same vein, the results of this study are consistent with a study by Halil (2012) in that the use of social networks communication tools is for fun, sharing, social responsibilities, educational purposes as well as communication.

To sum up; the exchange of personal information has come to be the major purpose for using social networking; other purposes come secondary including information sharing (videos, photos, songs and poems) as well as improving social interaction.

5. Recommendations

In light of the findings of the current study, the researcher recommends the sponsors' companies of social network sites such as Facebook and Twitter to set their sites' priorities for more educational purposes; this can be done through providing better site services and improving performance, appearance and settings to secure increased demand. More over; the researcher recommends the current social network sites to secure clients' confidence by setting control standards (setting passwords' controls, etc.), and refrain from being used as a place to spread slander, defamation and libel under the pretext of freedom of opinion and expression.

In addition, the researcher encourages the communication companies to reduce the cost of their services in order to increase the number of users among students and their families to use the Internet and social media in educational purposes. Finally, this study encourages more scientific research and studies on the impact of social media on improving the quality of the educational products in the Arab world's institutions.

Acknowledgments

This is a research project that was supported by a grant from the Research Center for the Humanities, Deanship of Scientific Research at King Saud University, 2016.

References

Aljohani, R. (2009). *Uses of YouTube among University youth*. International Conference on New Media: New technology for a new world, Kingdom of Bahrain, University of Bahrain.

Al-Khalifa, H. (2008). *Utilizing Micro-Blogging services in education*. Retrieved from <http://www.tech2click.net/archives/917>

Barbour, M., & Plough, C. (2009). Social networking in cyber schooling: Helping to make online learning less isolating. *TechTrends Journal*, 53.

Brady, K., Holcomb, L., & Smith, B. (2010). The use of alternative social networking sites in higher educational settings: A case study of the e-Learning benefits of Ningin education. *Journal of Interactive Online Learning*, 9.

December, J. (1996). Units of analysis for Internet communication. *Journal of communication*, 46(1), 14-38. <http://dx.doi.org/10.1111/j.1460-2466.1996.tb01459.x>

DeSchryver, M., Mishra, P., Koehleer, M., & Francis, A. (2009). Moodle vs. Facebook: Does using Facebook for discussions in an online course enhance perceived social presence and student interaction? In I. Gibson et al. (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference*.

Dron, J., & Anderson, T. (2009). Lost in social space: Information retrieval issues in Web1.5. *Journal of Digital Information*, 10.

Greenhow, C. (2011). Online social networking and learning, *International Journal of Cyber Behavior, Psychology and Learning*, 1. <http://dx.doi.org/10.4018/ijcbpl.2011010104>

Greenhow, C., & Robelia, B. (2009). Old communication, new literacies: Social network sites as social learning resources. *Journal of Computer-mediated Communication*, 14(4), 1130-1161. <http://dx.doi.org/10.1111/j.1083-6101.2009.01484.x>

Halil, A. (2012). Teacher Candidates' Social Network Usage Tendencies: A Qualitative Investigation. *Social and Behavioral Sciences Journal*, 46.

Howard, J. (1996). *Virtual communities*. France: Addison-Wesley publishers.

Lee, M., & McLoughlin, C. (2010). *Beyond distance and time constraints: Applying social networking tools and Web 2.0 approaches to distance learning*. In G. Veletsianos (Ed.), *Emerging technologies in distance education* (pp. 61-87). Edmonton, AB: Athabasca University Press.

Livingston, S. (2008). Taking risky opportunities in youthful content creation: Teenagers use of social networking sites for intimacy privacy and self-expression London school of Economics and political science UK (ERIC) ED 46546.

Madge, C., Meek, J., Wellens, J., & Hooley, T. (2009). Facebook, social integration and informal learning at university: 'It is more for socializing and talking to friends about work than for actually doing work'. *Learning, Media and Technology Journal*, 34(2). <http://dx.doi.org/10.1080/17439880902923606>

Mckinney, L., & Rill, R. (2009). *Debating with YouTube: Examining the effects of a Targeted debate message on the intended Audience*. (ERIC) ED43494627.

Naveh, G., Tubin, D., & Pliskin, N. (2010). Student LMS use and satisfaction in academic institutions: The organizational perspective. *The Internet and Higher Education Journal*, 24.

Sari, A. (2008). The use of technology in E-learning. *Journal of Informatics*, 23.

Schroeder, G. (2011). Designing opportunities for transformation with emerging technologies. *Educational Technology Journal*, 51.

Selwyn, N. (2009). Face working: Exploring student's education-related use of Facebook Learning. *Media and Technology Journal*, 34.

Survey, M. (2006). E-learning and Web. *Journal of Informatics*, 12.

Umar, A. (1997). *Scientific research: concept, procedures and methods*. Benghazi: Garyounis University Press.

Webb, E. (2009). Engaging students with engaging tools. *Edu Cause Quarterly*, 32.

Wheeler, S., Yeomans, P., & Wheeler, D. (2008). The good, the bad and the wiki: Evaluating student-generated content for collaborative learning. *British Journal of Educational Technology*, 39(6), 987-995. <http://dx.doi.org/10.1111/j.1467-8535.2007.00799.x>

Yeomans, O. (2008). Web 2.0 applications in libraries/ *Cybrarians Journal*, 18.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).